

October 15, 2019

### **Denali Water Solutions, LLC's Proposed Sampling Plan for Desert Ridge Farms**

EPA's August 15, 2019 Section 308 Request for Information to Denali Waster Solutions, LLC ("Denali") that Denali analyze soil samples from Desert Ridge Farms, 2585 East County 19th Street, Yuma, Arizona 85365 (32°33'00"N – 32°30'00"N, 114° 37' 00"W – 114°34'00"W). Specifically, EPA's request sought samples at five depths on four locations per 120-acre field; Desert Ridge Farms has twenty fields total. This adds up to a total of 400 soil samples taken and analyzed.

### **Proposal**

Based on the information on the predominant soil profiles at Desert Ridge Farms described below, Denali proposes to sample four locations on each of the twenty 120-acre fields at two different depths: 0-24 inches and 24-48 inches. Denali proposes to composite the four samples taken at each depth per field and analyze each composite. Accordingly, Denali would take eight samples per field (for a total of 160 samples), and analyze 40 composite samples per field.

### **Desert Ridge Farms' Soil Data**

According to the attached data from the USDA's National Resources Conservation Service's ("NRCS") Web Soil Survey, Desert Ridge Farms' 3,500 acres are composed primarily of two soil types: Rositas-Ligurta complex occupies approximately 56.5% of the farm and Rositas sands occupies the remaining 39.1% of the farm. *See* USDA, NRCS's Web Soil Survey, "Soil Map—Luke Air Force Range, Arizona, Parts of Maricopa, Pima, and Yuma Counties; and Yuma-Welton Area, Parts of Yuma County, Arizona, and Imperial County, California" ("NRCS, Desert Ridge Farms Soil Data"). The Web Soil Survey is composed of soil data and information collected by the National Cooperative Soil Survey and coalesced, updated, and maintained by the NRCS to provide a general overview of soil data for over 95% of the nation's counties. The Web Soil Survey enables users to access location-specific soil data.

Because Desert Ridge Farms encompasses 3,500 acres, and there are only major two soil types over the entire area of the farm, most soils are fairly homogenous across each field. NRCS, Desert Ridge Farms Soil Data, p. 3. The two predominant soil types at Desert Ridge Farms have two primary layers: a top soil layer and a parent material layer. *Id.* The top soil is often known as the O and A horizons, which respectively consist of organic material accumulations and mineral material with plant root activity. NRCS, "Soils 101" (April 2007). The parent material layer is often known as the "C horizon" and is defined by NRCS as the substratum consisting of partially disintegrated unconsolidated organic and mineral material that form all soil layers. *Id.* According to the NRCS, a portion of the soils on site do have a "Btkn" layer (Ligurta), which is composed of gravel, but the majority of soils exhibit the Rositas or Rositas sand characteristics and therefore only have an A and C horizon. NRCS, Desert Ridge Farms Soil Data, p. 5.

The predominant soil types at Desert Ridge Farms have top soil layers ranging from 0-2 inches (Ligurta) to 0-5 inches below ground surface (Rositas, Rositas sand) and consist of either very

gravelly loam (Ligurta) or sand (Rositas, Rositas sand). NRCS, Desert Ridge Farms Soil Data, p. 4, 5, 7. The following soil layer for the two types of soil present at Desert Ridge Farms extends from 2 (Ligurta) or 5 (Rositas, Rosistas sand) inches below ground surface to 60 inches below ground surface and consists of sand (Rositas, Rositas sand) or gravelly clay loam (Ligurta). *Id.*

According to Steve Redger, the farmer of Desert Ridge Farms, “soil depths are shallow.” *See* Email from S. Redger to C. Marks (October 14, 2019). The farmer discs his fields before planting; he does not “plow the soil to depths exceeding 2 feet and only use[s] a disc that turns the top soil.” *Id.* When a field is disced, the disc mixes the soil from the soil surface to the depth of the disc blades, which have varied from 6 to 24 inches. Soil and any soil amendments (such as biosolids or fertilizers) on the surface gets mixed, or incorporated, with soils ranging from 6-24 inches below the surface, creating a relatively homogenous mixture of soil. The farmer’s discing practices suggest that nutrients generally do not move much deeper than the plow layer, though with any ecosystem and active farming site there can be anomalies.

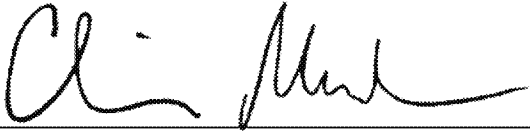
NRCS recommends sampling soils at the surface sample and a subsurface sample. NRCS, “The Importance of Soil Sampling,” (April 2007). Based on the soil profile data and the depth to which the farmer discs, Denali proposes to sample at two depths: one sample in the top soil layer which is plowed, from 0-24 inches, and one in the following soil layer, from 24-48 inches. Given that each of the two layers is relatively homogenous, per NRCS data and the farmer’s discing practices, sampling at these two depths would likely provide a representative profile of the farm’s soil.

### **Composite**

Denali proposes to composite the four samples taken at each depth based in order to provide a representative depiction of soil profiles. Compositing the samples would ensure a more accurate characterization of conditions at the field level. In agricultural systems where soil is mixed by ploughing, the bulking of discrete samples to obtain composite samples generally improves soil sampling precision. Compositing samples is especially appropriate in a location like Desert Ridge Farms, where soils are naturally relatively homogenous and the applied agricultural practices (discing) would be expected to average out any localized concentrations or deficiencies of biosolids.

### STATEMENT OF CERTIFICATION

I certify under penalty of perjury of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.



\_\_\_\_\_  
Signature

Chris Marks

\_\_\_\_\_  
Printed Name

Environmental Manager

\_\_\_\_\_  
Title

10/15/19

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Date